

CONTRACT DOCUMENTS AND SPECIFICATIONS
PAVEMENT MARKINGS

CITY OF GALLATIN

ENGINEERING DIVISION
132 WEST MAIN STREET
GALLATIN, TENNESSEE 37066

DATE: August 8, 2014

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INVITATION TO BID
&
INFORMATION FOR BIDDERS

SECTION A

INVITATION TO BID

Sealed bids will be received by the City of Gallatin in the Finance Department, Room 106, City Hall, 132 West Main Street, Gallatin, Tennessee until 2:30 p.m. local time, **August 28, 2014**, at which time they will be opened and read aloud for INSTALLATION OF PAVEMENT MARKINGS.

Plans, Specifications, Proposal Forms, and Contract Documents may be inspected at, and obtained from, the City Engineer's Office after 2:00 p.m. local time, **AUGUST 14, 2014**, or by downloading from the City's home page www.gallatinonthemove.com under "Quick Links – Public Notice."

All bidders must be licensed contractors. The City of Gallatin reserves the right to reject any or all bids.

INFORMATION FOR BIDDERS

All bidders must satisfy themselves by personal examination of the locations of the proposed work, by examination of the Plans and Specifications and requirements of the work and the accuracy of the estimate of the quantities of the work to be done, and shall not at any time after the submission of a bid dispute or complain of such estimate nor assert that there was any misunderstanding in regard to the nature or amount of work to be done. The City shall not be responsible for bidders' errors and misjudgments, nor any information on local conditions or general laws and regulations.

The Plans, Documents, and Specifications contain the provisions required for INSTALLATION OF PAVEMENT MARKINGS. No information obtained from any officer, agent, or employee of the City on any such matters shall in any way affect the risk or obligation assumed by the Contractor or relieve him from fulfilling any of the conditions of the contract.

All bids must be made on the blank form of proposal attached hereto. **Bids must be submitted in a sealed envelope clearly marked "BID – INSTALLATION OF PAVEMENT MARKINGS."** Bids arriving after the announced opening time or absent of the aforementioned markings will not be accepted.

All bidders must be licensed contractors. **No bid will be opened if the following information does not appear on the envelope containing the bid.**

1. Bidder's Name
2. Address
3. Tennessee Contractor's License Number
4. License Expiration Date
5. Name of Project for which Bid is submitted
6. Name and License information for all Subcontractors who will perform work.

Proposals which are incomplete, unbalanced, conditional, or obscure or which contain additions not called for, erasures, alterations or irregularities of any kind or which do not comply with the Invitation to Bid and Information for Bidders may be rejected at the option of the City. Bids must be written with typewriter, ink or indelible pencil; otherwise they may not be considered. Faxed bids will not be accepted.

The City of Gallatin reserves the right to disregard all nonconforming, nonresponsive, or conditional bids; to reject any or all bids; to limit quantities; to waive informalities; and to evaluate proposals and accept any proposal or any part of any proposal that is judged, in our opinion, to be of the best quality, value, and service to the City of Gallatin.

A bidder may withdraw any proposal he has submitted at any time prior to the hour set for the closing of the bids, provided the request for withdrawal is signed in a manner identical with the proposal being withdrawn. No withdrawal or modification will be permitted for 60 days after the hour and date designated for opening the bids.

All questions or explanations requested by Bidders shall be submitted in writing to the City in ample time to permit consideration before the bid date. Necessary replies will be issued to all bidders of record as Addenda and receipt thereof shall be acknowledged on the proposal. Bidders shall check with the City prior to bid opening to secure any Addenda that may affect bidding. Oral instructions will not be given and do not form a part of the Bidding Documents.

Contractor will be paid based on quantities complete and in place.

In case of default of the Contractor, the City may procure the articles of services from other services and hold the Contractor responsible for any excess cost occasioned thereby.

Bids must be executed in the Company name and signed by an officer or individual who has authority to bind the Company.

In cases of errors in the extension of prices in the bid, the unit price will govern. No bid shall be altered or amended after the specified time for opening bids.

All material and workmanship shall be subject to inspection. In case any articles are found to be defective in material or workmanship, or otherwise not in conformity with the specification requirements, the City shall have the right to reject such articles or require their correction. Final inspection shall be conclusive except as regards latent defects, fraud, or such gross mistakes as amount to fraud.

A change order will be issued only in the event of a change in the scope of work.

All bid proposals must include the following:

1. Sealed envelope with required information on the outside.
2. Bid Proposal Form
3. Drug-Free Workplace Affidavit.

The successful bidder must provide the following, each of which shall be in accordance with the contract documents:

1. Performance surety covering and including labor and materials in the amount of one hundred percent (100%) of the contract price. The performance bond will be released within 90 days after owner inspects all completed work and considers it acceptable.
2. Certificate of Insurance naming the **City of Gallatin** additionally insured with any exclusions listed, including
 - General Liability
 - Worker's Comp
 - Auto Insurance
3. Proof of Worker's Comp for all Subcontractors
4. W-9 Form, if a new vendor

Additional Requirements:

- The successful bidder will also be responsible for payment of all taxes levied under the laws of the State of Tennessee.
- The successful bidder shall have the responsibility to insure that all persons employed under a contract with the City, whether directly or by subcontract, be legal residents and be authorized to work in the United States.
- Affirmative Action compliance is required.

All interested parties, without regard to race, color, or national origin, shall be afforded the opportunity to bid and shall receive equal consideration.

Additional information may be obtained by contacting Dewayne Rogers, Project Engineer, at (615) 451-5965.

<i>EQUAL OPPORTUNITY TITLE VI POLICY STATEMENT</i>

It is the policy of the City of Gallatin to ensure compliance with Title VI of the Civil Rights Act of 1964; 49 CFR, Part 21; related statutes and regulations to the end that no person shall be excluded from participation in or be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance from the U. S. Department of Transportation on the grounds of race, color, sex, age, disability or national origin.

ACKNOWLEDGEMENT OF ADDENDA

Acknowledgment is hereby made or receipt of Addenda Nos. _____, the provisions of which are incorporated herein.

Respectfully Submitted,

BY _____

TITLE _____

ADDRESS _____

TENNESSEE LICENSE NUMBER _____

Seal-If Bid is by Corporation

**BID PROPOSAL
INCLUDING DRUG FREE AFFIDAVIT**

SECTION B

PROPOSAL

ENGINEERING DIVISION
GALLATIN, TENNESSEE 37066

In response to the Invitation to Bid, the undersigned Bidder submits the following proposal for INSTALLATION OF PAVEMENT MARKINGS within the City of Gallatin as described and specified in the drawings, contract documents, and technical specifications.

The Bidder declares that he has examined the Plans, Specifications, and Contract Documents for the work, and has read all the Special Provisions furnished prior to the opening of bids; and that he has satisfied himself relative to the work to be performed.

The quantities shown in the Proposal are approximate only and are subject to increase or decrease and, should the quantities of any of the items of work be increased, the undersigned proposes to do the additional work at the unit prices set out herein; and should the quantities be decreased, the undersigned will make no claim for anticipated profits.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

The Bidder hereby agrees that if he is awarded the Contract for this Work, he will commence work upon receiving written "Notice of Award" and to fully complete the work as directed by the City Engineer.

The undersigned Bidder does hereby declare and stipulate that this Proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same work, and that it is made in pursuance of and subject to all the terms and conditions of the Contract, the Specifications, and the Plans pertaining to the Work to be done.

Contract unit prices shall be for a one-year period, at which time the City of Gallatin, at their option, may elect to extend the Contract for one additional year.

**BID PROPOSAL
INSTALLATION OF PAVEMENT MARKINGS**

In compliance with your legal Invitation to Bid for the City of Gallatin INSTALLATION OF PAVEMENT MARKINGS, the undersigned Bidder, a corporation organized and existing under the laws of the State of _____, or a partnership of _____, or an individual doing business as _____ of the City of _____

State of _____, having examined the Specifications and Contract forms thereto attached, and being fully advised as to the extent and character of the work to be performed, and the equipment to be furnished, hereby proposes to furnish all labor, tools, material and equipment necessary for the Project.

The Bidder shall complete all tables to establish his Bid. The undersigned further proposes to perform all work and furnish all equipment in accordance with the Specifications and Contract stipulations thereof, within the time limit specified, for the price so stated below.

BASE PROPOSAL: Bidder agrees to perform all sidewalk and handicap ramp installation as described in the specifications and shown on the bid schedule for the sum of _____ (\$_____)

(Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

BID SCHEDULE:

<u>Item Number</u>	<u>Item</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Extended Amount</u>
1.1	Plastic Pavement Marking (90 Mil) (4 Inch Line)	L.M. 4.5		
1.2	Plastic Pavement Marking (90 Mil) (6 Inch Line Bike Lane)	L.M. 3.0		
1.3	Plastic Pavement Marking (60 Mil Thin Line) (4 Inch Line)	L.M.		
1.4	Plastic Pavement Marking (60 Mil Thin Line) (6 Inch Line Bike Lane)	L.M.		

1.5	Plastic Pavement Marking Channelization Striping (90 Mil) (8" Line)	L.F.	_____	_____	_____
1.6	Plastic Pavement Marking (90 Mil) (8 Inch Line X-Walk)	L.F.	_____	_____	_____
1.7					
1.8	Painted Pavement Marking Solid Barrier Line (Water Base)	L.F.	_____	_____	_____
1.9	Plastic Pavement Marking (Stop Bar)	L.F.	<u>700</u>	_____	_____
1.10	Plastic Pavement Marking (Turn Arrows)	Each	_____	_____	_____
1.11	Plastic Pavement Marking (Combination Arrows)	Each	_____	_____	_____
1.12	Plastic Pavement Marking (Railroad Crossing)	Each	_____	_____	_____
1.13	Plastic Pavement Marking (Bike Symbol/Arrow)	Each	<u>20</u>	_____	_____
1.14	Handicap Symbol (Painted Blue Background)	Each	_____	_____	_____
2.1	Raised Reflective Pavement Markers	Each	_____	_____	_____
2.2	Snowplowable Raised Reflective Pavement Markers	Each	_____	_____	_____

Total Bid

\$_____

**ESTIMATED QUANTITIES SHOWN ABOVE ARE FOR BIDDING PURPOSES ONLY.
PAYMENT WILL BE MADE, USING UNIT COSTS SUBMITTED, BASED UPON
ACTUAL LENGTHS INSTALLED, APPROVED AND ACCEPTED BY CITY.**

Respectfully submitted:

Contractor

By: _____

Title: _____

Business Address: _____

Contractor's License No: _____

Telephone Number: _____

AGREEMENT BETWEEN
OWNER AND CONTRACTOR

THIS AGREEMENT made as of the _____ day of _____, _____, by and between the OWNER: CITY OF GALLATIN, TENNESSEE, and.

WITNESSETH THAT the OWNER and the CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK. The CONTRACTOR will perform all Work as shown in the Contract Documents for the completion of the Project generally described as follows: Installation of Sidewalks and Handicap Ramps.

Article 2. ENGINEER. The Project has been designed by the City of Gallatin City Engineer, 132 West Main Street, Gallatin, Tennessee. The City Engineer will act as the ENGINEER in connection with completion of the Project in accordance with the Contract Documents.

Article 3. CONTRACT TIME. The Work for this Contract shall be completed within the timeframe of the contract, after the date which the CONTRACTOR is to start the Work as provided in the Contract Documents.

Article 4. CONTRACT PRICE. The OWNER will pay the CONTRACTOR for performance of the Work and completion of the Project in accordance with the Contract Documents subject to adjustment by Modifications as provided therein in current funds as follows:

_____ and _____ Cents
(\$_____) in accordance with the conditions and prices stated in the Proposal.

Article 5. PAYMENT. The OWNER will pay the CONTRACTOR upon completion and acceptance of all the Work covered in this Contract based on the unit prices stated in the proposal and quantities actually in place.

Article 6. MISCELLANEOUS.

6.1 Neither the OWNER nor the CONTRACTOR shall, without the prior consent of the other, assign or sublet in whole or in part his interest under any of the Contract Documents and, specifically, the CONTRACTOR shall not assign any monies due or to become due without consent of the OWNER.

6.2 The OWNER and the CONTRACTOR each binds himself, his partners, successors, assigns, and legal representatives to the other party hereto in respect to all covenants, agreements, and obligation contained in the Contract Documents.

6.3 The Contract Documents constitute the entire agreement between the OWNER and the CONTRACTOR and may only be altered, amended, or repealed by a duly-executed written instrument.

Article 7. TIME FOR COMPLETION AND LIQUIDATED DAMAGES. It is hereby understood and mutually agreed, by and between the CONTRACTOR and the OWNER, that the time for completion as specified in the Contract is an ESSENTIAL CONDITION of this Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the Notice to Proceed, and that said Work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within twelve weeks thereafter. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the time for the completion of Work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality. If the said CONTRACTOR shall neglect, fail, or refuse to complete the Work within the time herein specified, or any proper extension thereof granted the OWNER, then the CONTRACTOR does hereby agree, as a partial consideration for the awarding of this Contract, to pay to the OWNER, not as a penalty but as liquidated damages for such breach of Contract as hereinafter set forth, \$100 for each and every calendar day that the CONTRACTOR shall be in default after the time stipulated for completing the Work of the total Contract.

The same amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would in such event sustain, and said amount shall be retained from time to time by the OWNER from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever and, where under the Contract, an additional time is allowed for the completion of any Work, the new time limit fixed by such extension shall be of the essence of this Contract. Provided, that the CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is due:

7.1 To any preference, priority, or allocation order duly issued by the Government;

7.2 To unforeseeable cause beyond the control and without the fault or negligence of the CONTRACTOR, including, but not restricted to, acts of God or of the public enemy, acts of the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; and

7.3 To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections 7.1 and 7.2 of this article;

Provided, further, that the CONTRACTOR shall, within ten days from the beginning of such delay, unless the OWNER shall grant a further period of time prior to the date of final settlement of the Contract, notify the OWNER, in writing, of the causes of the delay, who shall

ascertain the facts and extent of the delay and notify the CONTRACTOR within a reasonable time of its decision in the matter.

ARTICLE 8 - CONTRACT DOCUMENTS

8.01 The Contract Documents will consist of the following:

- A. This Agreement (5 pages, inclusive).
- B. Technical Specifications as listed in Section D of this document.
- C. Addenda (numbers ___ to ___ , inclusive).

8.02 There are no Contract Documents other than those listed above in this Article 8. Approved Shop Drawings and Samples, other Contractor's submittals and the reports and drawings of subsurface and physical conditions are not Contract Documents.

IN WITNESSETH WHEREOF the parties hereto have executed this Agreement the day and year first above written.

OWNER: CITY OF GALLATIN,
TENNESSEE

CONTRACTOR: _____

BY: _____

BY: _____
JO ANN GRAVES, MAYOR

ATTEST:

CONNIE KITTRELL, CITY RECORDER

DRUG-FREE WORKPLACE AFFIDAVIT

State of Tennessee)
County of Sumner)

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with the City of Gallatin, 132 W. Main Street, Gallatin, TN 37066 to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____(hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the State or any local government to provide construction services, to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the Tennessee Code Annotated.
3. The Company is in compliance with T.C.A § 50-9-113.

Further affidavit saith not,

Principal Officer

President

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____ day of _____, 20__.

Notary Public

My commission expires:

NOTICE OF AWARD

SECTION C

NOTICE OF AWARD

TO: _____

PROJECT DESCRIPTION: INSTALLATION OF PAVEMENT MARKINGS

We have considered the Bid submitted by you for the above-described Work in response to our Invitation to Bid and are pleased to award the contract to your company.

You are required to execute the enclosed Agreement and furnish the required Contractor's Performance and Payment Bond within 10 calendar days from the date of this Notice.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20__.

City of Gallatin
(Owner)

By: _____

Title: _____ Mayor _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged.

Contractor
By: _____

Title: _____

This the _____ day of _____, 20__

TECHNICAL SPECIFICATIONS

SECTION D

TECHNICAL SPECIFICATIONS
FOR
INSTALLATION OF PAVEMENT MARKINGS

Section 1.0

TECHNICAL SPECIFICATIONS
FOR THERMOPLASTIC & PAINTED PAVEMENT MARKING

1. Description

This work shall consist of placing painted pavement markings on asphaltic concrete surface at the direction of the Engineer. This work will be accomplished after the entire paving has been completed. All work shall be in accordance with these Specifications and the latest revision of the Manual of Uniform Traffic Control Devices for streets and highways. Temporary pavement marking will not be paid under this item.

2. Materials

Reference for material specification is made to the TDOTSS, 2006, and any applicable special provision thereto. Specific reference is made to Section 716, Pavement Markings, and Section 910, Paint.

3. Equipment

All equipment necessary for the placing of pavement markings shall meet the above-mentioned TDOTSS, 2006, and all special provisions.

4. Construction Requirements

Thermoplastic Pavement Marking.

(a) General.

The material shall be applied to the pavement by the screed extrusion method wherein one side of the shaping die is the pavement and the other 3 sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material.

Each application machine must be equipped with an automatic counting mechanism capable of recording the number of linear feet (meters) of material applied to the roadway surface with an accuracy of 0.50%, to be checked by the Engineer.

The equipment shall be constructed to provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the shaping die shall be so constructed as to prevent accumulation and clogging. All parts of the equipment which come in contact with the material shall be so constructed as to be easily accessible for cleaning and maintenance. The equipment shall be constructed so that all mixing and conveying parts up to and including the shaping die, maintain the material at the plastic temperature with heat transfer oil or electrical element controlled heat. Direct fire heat transfer will not be allowed.

The equipment shall be so constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a method of applying "skip" lines. The use of pans, aprons, or similar appliances which the die overruns will not be permitted under this Specification. The equipment shall be calibrated, and checked periodically by marking over a metal plate. The equipment will be so constructed as to provide for varying widths to produce varying widths of traffic markings.

Glass spheres applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instantaneously upon the installed line. The glass sphere dispenser cut-off shall be synchronized with automatic cut-off of the thermoplastic material.

Special kettle(s) shall be provided for melting and heating the thermoplastic material. The kettle(s) must be equipped with automatic thermostatic control devices so that heating can be done by controlled heat transfer rather than by direct flame, so as to provide positive temperature control and prevent over-heating of the material.

Applicators shall be mobile and maneuverable to the extent the straight line can be followed and normal curves can be made in a true arc.

The applicator equipment to be used on roadway installations shall consist of either hand equipment or truck mounted units depending on the type of marking required.

The hand equipment shall have sufficient capacity to hold 150 lbs(70 kgs) of molten material and shall be sufficiently maneuverable to install crosswalks, lane, edge, and center lines, arrows and legends. The truck mounted unit for lane, edge and center lines shall consist of a mobile self contained unit carrying its own material capable of operating at a minimum speed of 5 mph(8 kph) continuously during an 8 hour period while installing striping.

As an alternate, the Contractor may apply preformed thermoplastic marking material for stop bars, cross walks, legends or directional arrows. The preformed thermoplastic material shall have a minimum thickness of 0.125 in. (3 mm) and fused to the pavement by the heat of a torch.

(b) Application.

The pavement temperature shall be a minimum of 50° F(10° C) and rising before application begins. Application shall be suspended at any time the pavement temperature falls below 50° F(10° C). All surfaces to be marked shall be thoroughly cleaned of all dust, dirt, grease, oil and all other foreign matter before application of the striping.

To insure optimum adhesion of thermoplastic applied on all portland cement concrete pavement, the Contractor shall apply a binder-sealer material as recommended by the thermoplastic manufacturer. A binder-sealer material shall also be applied to asphaltic concrete pavements which have been open to traffic for ninety or more days. The binder-sealer material will form, when applied with conventional mobile paint spraying equipment, a continuous film over the pavement surface which will dry rapidly and adhere to the pavement surface. The binder-sealer shall be that product currently in use and recommended by the thermoplastic material manufacturer. To insure optimum adhesion, the thermoplastic material shall be installed in a melted state at a temperature of 400 to 450° F(205 to 230° C).

The material, when formed into traffic stripes, must be readily renewable by placing an overlay of new material directly over an old line of compatible material. Such new material shall bond itself to the old line in such a manner that no splitting or separation takes place.

Longitudinal lines shall be off-set at least 2 in. (50 mm) from longitudinal joints of Portland Cement Concrete pavements.

Unless specified on the plans, a minimum average film thickness of 0.090 in. (2.25 mm) for lane and edge lines shall be maintained on all markings. This is to be computed on the basis of the amount of material used each day. The film thickness shall be uniform in appearance throughout its application. The glass sphere top coating must be applied by means of a pressure type spray gun designed specifically for this purpose, and which will embed the spheres into the line surface to at least one-half their diameter. The glass spheres shall be applied at the rate of 1 lb of spheres per 10 s.f. (1 kg to each 2 m²) of compound.

When thermoplastic is used on the final surface, the Contractor shall have the option of using reflectorized paint installed to permanent standards at the end of each day's work and then installing the permanent marking after the paving operation is completed. Short, unmarked sections will not be allowed. The temporary markings for the final surface will not be measured and paid for directly, but the costs are to be included in the price bid for the permanent markings.

5. Measurement

- a. Pavement Marking (Line) – The mileage of line complete in place and accepted shall be measured along the center of each line. Where double solid barrier lines are used, each solid barrier line will be measured separately for payment. Where broken lane lines are used, only the marked line will be measured for payment.
- b. Pavement Marking (Crosswalk Striping) and Pavement Marking (Stop Line) – The length of each striping complete in place and accepted will be measured in linear feet to the nearest foot along the centerline of each pavement marking. The boundary lines of the crosswalk will not be measured separately.
- c. Pavement Marking (Channelization Striping) – The area of channelization striping, including the boundary lines complete in place and accepted, shall be measured and computed in linear feet to the nearest foot.

- d. Pavement marking (Designs) – Designs or lettering will be measured for payment by the unit (each) complete in place or as stipulated in the Contract and on the Plans.

5. Basis of Payment

- a. The Contractor shall be required to establish and locate all non-passing zones, as well as provide the layout of all pavement markings, for approval of the Engineer prior to placement of markings.
- b. Payment will be made under the following bid items as set forth in the Bid Schedule.

<u>Pay Item</u>	<u>Unit</u>
Thermoplastic Pavement Marking (Line)	Linear Mile
Painted Pavement Marking (Line)	Linear Foot
Pavement Marking (Crosswalk Striping)	Linear Foot
Pavement Marking (Stop Line)	Linear Foot
Pavement Marking (Channelization Striping)	Linear Foot
Pavement Marking (Designs)	Each

Section 2.0

TECHNICAL SPECIFICATIONS FOR RAISED REFLECTIVE PAVEMENT MARKERS

1. General:

Markers shall be bonded to the pavement with a bituminous adhesive conforming to the requirements as described below and spaced as shown on the Plans. Markers shall not be installed over joints in rigid type pavements.

The pavement markers shall be of a type listed on TDOTS QPL. The markers shall be installed when the pavement is dry and the pavement temperature is no less than 50° F(10° C).

The portion of the highway surface to which the marker is to be bonded by the adhesive shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint and any other material which would adversely affect the bond of the adhesive. Cleaning shall be done by blast cleaning on Portland cement concrete and old bituminous pavements. New bituminous pavement shall be blast cleaned where, in the judgment of the Engineer, the surface contains an abnormal amount of asphalt or the surface is contaminated with dirt, grease, paint, oil or any other material which would adversely affect the bond of the adhesive.

The bituminous adhesive shall be melted and heated in either thermostatically controlled double boiler type units utilizing heat transfer oil or thermostatically controlled electric heating pots. Direct flame melting units shall not be used. The melter/applicator unit shall be suited for both melting and pumping application through heated applicator hoses.

The adhesive shall be heated to between 375 and 425° F(190 and 220° C) and applied directly to the pavement surface from the melter/applicator by either pumping or pouring. It is important that the application temperature be maintained between 375 and 425° F(190 and 220° C) as lower temperatures may result in decreased adhesion while higher temperatures may damage the adhesive.

The adhesive shall be applied in a puddle approximately 2/3 to 3/4 the diameter of the marker. Markers shall be applied to the adhesive immediately(within 10 seconds) to assure bonding. The marker shall be placed in position by applying downward pressure until the marker is firmly seated with the required adhesive thickness and squeeze out. Excessive adhesive squeeze out shall be removed from the pavement, and adhesive on the exposed surfaces of the markers shall be immediately removed. Soft rags moistened with mineral spirits conforming to Federal Specification TT-T-291 or kerosene may be used if necessary, to remove adhesive from exposed faces of pavement markers. No other solvent shall be used.

Reflective markers shall be installed so that the reflective face of the marker is perpendicular to a line parallel to the roadway centerline. The markers shall be protected against impact until the adhesive has hardened to the degree designated by the Engineer.

The adhesive may be reheated and reused. However, the manufacturer's recommendations regarding the pot life at application temperatures shall not be exceeded.

Clean out of equipment and tanks may be performed using petroleum solvents such as diesel fuel or similar materials. All heating equipment shall be turned off before cleaning operations are begun. All solvent must be removed from the equipment tanks and lines before the next use of the melter.

Snowplowable Reflective Pavement Marker

The pavement at each snowplowable marker location shall be contoured to match the bottom of the marker casting. Installation procedures shall conform to the recommendations of the marker manufacturer. When utilizing the dry saw method, a vacuum system shall be provided to contain the dust. Regardless of the saw method, the saw cut shall be clean, dry, and free of any dust or residue prior to application of the adhesive. Each shipment of adhesive shall be accompanied by a written statement from the manufacturer of the adhesive certifying that the material furnished conforms to the recommendations of the marker manufacturer, and stating the minimum temperature at which the adhesive can be satisfactorily mixed and/or applied.

2. Measurement

The number of each type of pavement markers installed as directed and accepted will be counted separately for payment.

3. Basis of Payment

The Contractor shall be required to establish and locate placement of raised reflective pavement markers or snowplowable reflective pavement markers. The contract unit bid price complete in place, shall be full compensation for layout, materials, labor, equipment, tools, royalties, and other necessary incidentals required to complete the work.

Section 3.0

TECHNICAL SPECIFICATIONS FOR RETROREFLECTIVE PREFORMED PAVEMENT MARKINGS

1. Description

This work shall consist of furnishing and installing retroreflective high performance and high durability preformed pavement markings. All preformed markings shall be installed in accordance with this provision and in conformance to the dimensions and lines shown on the Plans or established by the Engineer. All work shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, dated 2009, or as modified.

2. Materials

The preformed patterned markings shall consist of white or yellow films with clear and/or yellow-tinted microcrystalline ceramic beads incorporated to provide immediate and continuing retroreflection. These films shall be manufactured without the use of lead chromatic pigments or other similar, lead-containing chemicals. The films shall have a pressure sensitive adhesive pre-coated on the non-reflective side.

Preformed symbol and legend markings shall conform to the applicable shapes and sizes as outlined in the Manual on Uniform Traffic Control Devices for Streets and Highways, dated 2009, or as modified.

The material, when applied according to the manufacturer's instructions, shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable. The film shall be weather resistant and, through normal traffic wear, shall show no fading, lifting or shrinkage which will significantly impair the intended usage of the marking and shall show no significant tearing, roll back, or other signs of poor adhesion.

a. Classification

1. Type 1 - High Performance Patterned Centerline Markings

The markings shall be highly durable retroreflective pliant polymer materials designed for longitudinal centerline and word/symbol markings subject to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations.

2. Type 2 - Durable Longitudinal Edgeline Markings

The markings shall be durable, retroreflective, foil-based pavement marking film designed for preformed markings with free-rolling traffic for edge lines.

3. Type 3 - High Durability Channelizing and Transverse Markings

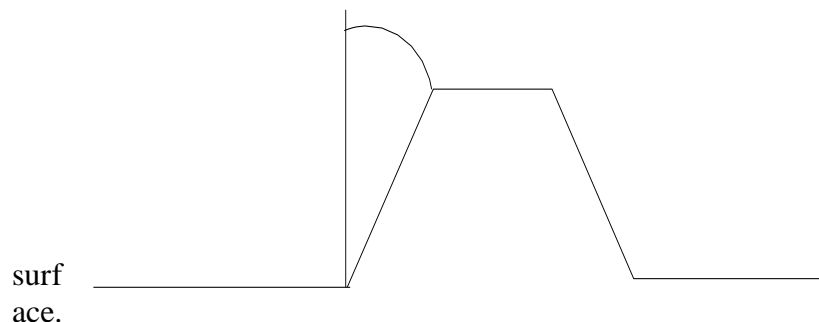
High durability retroreflective preformed pavement marking film shall be used as channelizing and transverse markings such as stop bars, cross walks, and gore markings subjected to high traffic volumes and severe wear conditions such as repeated shear action from crossover or encroachment.

b. Requirements

1. Composition

Type 1 - High Performance Patterned Centerline Markings

The retro reflective pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments, and glass beads distributed throughout its base cross-sectional area, with a reflective layer of microcrystalline ceramic beads bonded to a durable polyurethane topcoat



The patterned surface shall have approximately $50\% \pm 15\%$ of the surface area raised and presenting a near vertical face (β angle of 0° to 60°) to traffic from any direction. (See diagram below.) The channels between the raised areas shall be substantially free of exposed beads or particles. The film shall have a pre-coated pressure sensitive adhesive.

Type 2 - Durable Longitudinal Edgeline Markings

The retroreflective pavement marking material shall consist of microcrystalline ceramic beads and glass beads with ceramic skid-resistant particles embedded in a top polyolefin wear surface with a thin, flexible, conformable backing. The film shall have a pre-coated pressure sensitive adhesive.

Type 3 - High Durability Channelizing and Transverse Markings

The preformed markings shall consist of white or yellow films with pigments selected to conform to standard highway colors. The preformed markings shall consist of a mixture of high quality polymeric materials, pigments, and glass beads distributed throughout its base cross-sectional area.

A retroreflective layer of glass beads and a layer of ceramic skid resistant particles shall be bonded to the top urethane wear surface. The urethane wear surface shall have a nominal thickness of 0.005 inches (0.13mm). The film shall have a pre-coated pressure sensitive adhesive.

2. Retroreflectance

The white and yellow markings shall have the following initial expected retroreflectance values as measured in accordance with the testing procedures of ASTM D4061. The photometric quantity to be measured shall be coefficient of retroreflected luminance (RL) and shall be expressed as millicandelas per square foot per foot-candle $[(\text{mcd} \times \text{ft}^{-2}) \times \text{fc}^{-1}]$. The metric equivalent shall be expressed as millicandelas per square meter per lux $[(\text{mcd} \times \text{m}^{-2}) \times \text{lx}^{-1}]$.

Type 1 - High Performance Patterned Centerline Markings

	<u>WHITE</u>			<u>YELLOW</u>		
Entrance Angle	86.0°	86.5°	88.8°	86.0°	86.5°	88.8°
Observation Angle		0.2°	1.0°	1.05°	0.2°	1.0° 1.05°
Retroreflected Luminance R_L $[(\text{mcd} \times \text{ft}^{-2}) \times \text{fc}^{-1}]$	1100	700	500	800	500	300

Type 2 - Durable Longitudinal Edgeline Markings

	<u>WHITE</u>			<u>YELLOW</u>			
Entrance Angle	86.0°	86.5°	88.8°	86.0°	86.5°	88.8°	
Observation Angle		0.2°	1.0°	1.05°	0.2°	1.0°	1.05°
Retroreflected Luminance	930	575	450	430	300	205	
R _L [(mcd x ft ⁻²) x fc ⁻¹]							

Type 3 - High Durability Channelizing and Transverse Markings

	<u>WHITE</u>			<u>YELLOW</u>			
Entrance Angle	86.0°	86.5°	88.8°	86.0°	86.5°	88.8°	
Observation Angle		0.2°	1.0°	1.05°	0.2°	1.0°	1.05°
Retroreflected Luminance	700	400	300	410	175	150	
R _L [(mcd x ft ⁻²) x fc ⁻¹]							

3. Beads

Type 1 - High Performance Patterned Centerline Markings

Index of Refraction - All microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have a minimum index of refraction of 1.50 when tested by the liquid oil immersion method.

Type 2 - Durable Longitudinal Edgeline Markings

Index of Refraction - All microcrystalline ceramic and glass beads bonded to the polyolefin-coated surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method.

Type 3 - High Durability Channelizing and Transverse Markings

Index of Refraction - All glass beads bonded to the polyurethane-coated surface of the material shall have a minimum index of refraction of 1.50 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have a minimum index of refraction of 1.50 when tested by the liquid oil immersion method.

4. Skid Resistance

Type 1 - High Performance Patterned Centerline Markings

The patterned surface of the retroreflective pliant polymer shall provide an initial average skid resistance value of 45 BPN as measured by the British Portable Skid Tester in accordance with ASTM E303 except values will be taken downweb and at a 45° angle from downweb. These two values will then be averaged to find the skid resistance of the patterned surface.

Type 2 - Durable Longitudinal Edgeline Markings

The surface of the durable retroreflective films shall provide an initial minimum average skid resistance value of 55 BPN as measured by the British Portable Skid Tester in accordance with ASTM E303.

Type 3 - High Durability Channelizing and Transverse Markings

The surface of the highly durable retroreflective films shall provide an initial minimum average skid resistance value of 55 BPN as measured by the British Portable Skid Tester in accordance with ASTM E303.

5. Patchability

The pavement marking materials shall be capable of use for patching worn areas of the same type in accordance with the manufacturer's instructions.

6. Thickness

Type 1 - High Performance Patterned Centerline Markings

The film, without adhesive, shall have a minimum caliper of 0.065 inches (1.651mm) at the thickest portion of the patterned cross-section and a minimum caliper of 0.020 inches (0.508mm) at the thinnest portion of the cross-section.

Type 2 - Durable Longitudinal Edgeline Markings

The film without adhesive shall have a minimum thickness of 0.012 inches (0.30mm).

Type 3 - High Durability Channelizing and Transverse Markings

The film without adhesive shall have a minimum thickness of 0.060 inches (1.52mm).

c. General Performance Considerations

The film, when applied according to the recommendations of the manufacturer, shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable. The film shall be weather resistant and, through normal traffic wear, shall show no fading, lifting, or shrinkage which will significantly impair the intended usage of the marking and shall show no significant tearing, roll back, or other signs of poor adhesion.

3. Equipment

Following proper application, the markings shall be immediately ready for traffic. The bidder, when bidding, shall identify the proper equipment necessary for proper application and make recommendations for application that will assure effective product performance. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's instruction.

4. Warranty

a. Type 1 - High Performance Patterned Centerline Markings

Warranty

The manufacturer warrants that pavement marking material sold for applications in the United States will remain effective for its intended use under normal traffic conditions and meet the minimum retained coefficient of retroreflection value of 100 millicandelas per foot squared per foot-candle (measured at 1.0° observation and 86.5° entrance angles) subject to the following provisions:

Table 1

<u>Application</u>	<u>Warranty Period</u>
Longitudinal markings	4 years
Words and Symbols	2 years

If the markings are applied in accordance with all the manufacturer's application recommendations and fail during the warranty period to retain the minimum reflectance values, fail to adhere to the roadway, or fail due to complete wear-through during the warranty period shown above (from the date of installation), the manufacturer's sole responsibility and purchaser's and user's exclusive remedy shall be:

The manufacturer will provide the replacement materials to restore the marking to its original effectiveness.

A visual night inspection must be made with a manufacturer's representative and a customer representative present to identify areas of the installation which appear to be below the minimum retained reflectance values specified in Table 1. Areas which appear to be below the minimum retained reflectance value shall be identified as "zones of measurement." To qualify for material replacement, a "zone" must be at least 360 feet in road length and consist of either edge lines, center lines, or lane lines, but not in combination, or a single word or symbol marking.

b. Type 3 - High Durability Channelizing and Transverse Markings

Warranty

The manufacturer warrants that pavement marking material sold for applications in the United States will remain effective for road presence and non-wear through under normal traffic and meet the minimum retained skid resistance of 45 BPN (ASTM E-303), subject to the following provisions:

Table 2

<u>Application</u>	<u>Legends</u>	<u>Warranty Period</u>	
		<u>Symbols</u>	<u>Channelizing Markings</u>
New Asphalt Inlay	2 years	2 years	1 year
	<u>Stop Bars</u>	<u>Crosswalks</u>	Gore Markings w/ ADT
New Asphalt Inlay	1 year	2 years	<u>Lane of 6,000 or Less</u>
			1 year

If the pavement markings are applied in accordance with application procedures provided by the manufacturer (which will be furnished to the applier upon request), and fail to retain the minimum skid resistance value, fail to adhere to the roadway, or fail due to complete wear-through during the warranty period shown above (from the date of installation), the manufacturer's sole responsibility and purchaser's and user's exclusive remedy shall be:

The manufacturer will provide replacement materials to restore the marking to its original effectiveness.

5. Construction Requirements

The markings shall be applied in accordance with the manufacturer's installation instructions. Marking configurations shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, dated 2009, or as modified.

The manufacturer shall provide application equipment, manual or automatic as necessary for the job requirements. These applicators shall be capable of applying two lines simultaneously of the appropriate width and spacing as determined by the marking requirements. This equipment shall be provided to the agency or its contractor representative at no cost for whatever period or number of occasions necessary to complete the work schedule.

6. Method of Measurement

Linear pavement markings will be measured in linear feet (linear meters) complete-in-place for the width specified.

7. Basis of Payment

- a. Retroreflective preformed pavement markings will be paid for at the Contract Unit Price, which shall be full compensation for preparing the pavement surface, for furnishing and placing all materials, and for all materials, labor, tools, equipment, and incidentals necessary to complete the work.
- b. Payment will be made under the following Bid Items as set forth in the Bid Schedule:

<u>Pay Item</u>	<u>Unit</u>
Preformed Pavement Marking, Linear (Type)	Lin. Ft.
Preformed Pavement Marking, Symbols/Legends	Ea.